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G. R. FISH

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MUSICAL CHIME SIGNAL CONSTRUCTION

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Fig. 1.

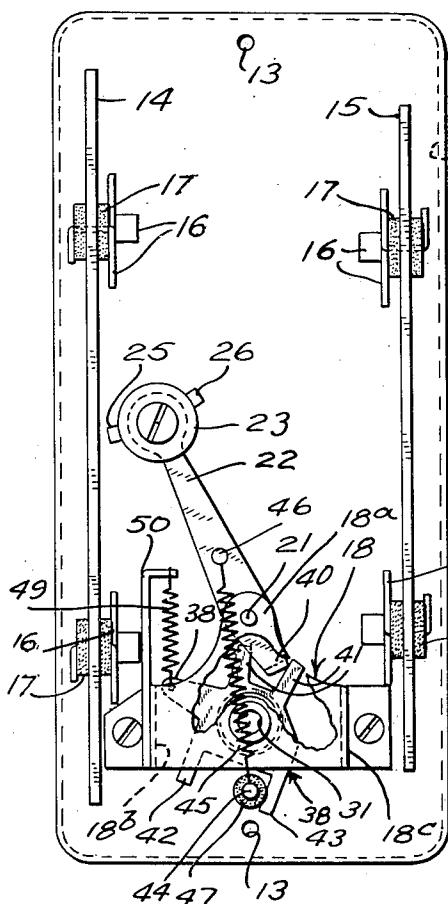


Fig. 3.

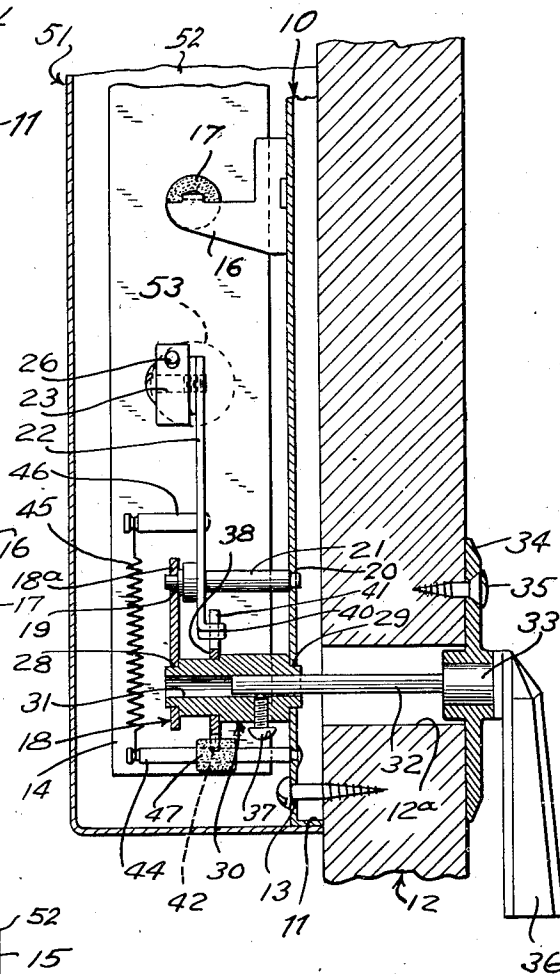
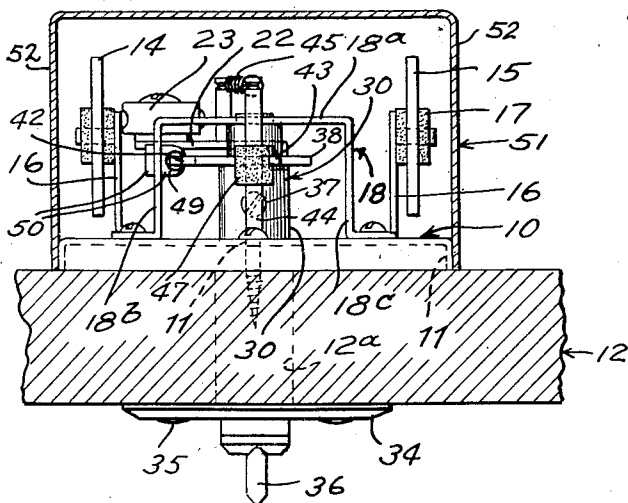


Fig. 2.



INVENTOR
GEORGE R. FISH.
BY
William T. Truesmer
ATTORNEY

UNITED STATES PATENT OFFICE

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MUSICAL CHIME SIGNAL CONSTRUCTION

George R. Fish, Norwalk, Conn., assignor to
Edwards and Company, Inc., Norwalk, Conn.,
a corporation of New York

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This invention relates to musical signalling apparatus.

One of the objects of this invention is to provide a simple and practical and compact mechanically-actuated musical signalling device such as may be attached to a door or door frame of a home, apartment, or the like. Another object is to provide a signalling device of the above-mentioned character that can be made up of individually simple and inexpensive parts and capable of speed and ease of assembly. Another object is to provide a signalling construction of the above-mentioned character that will be rugged and durable, of good musical action, and well adapted to withstand normal hard usage. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is illustratively shown a preferred embodiment of my invention,

Fig. 1 is a front elevation of the chime signalling device as seen with the cover removed;

Fig. 2 is an end elevation as seen from the bottom of Fig. 1; and

Fig. 3 is a fragmentary central sectional view of the device shown in Fig. 1, showing also the manner of installation of the device.

Similar reference characters refer to similar parts throughout the several views of the drawing.

I preferably provide a base plate 10 of sheet metal provided with a peripheral flange 11 which can rest against the face of the door or panel 12 (Fig. 3) to which the device may be secured in any suitable way as by screws, as indicated in Fig. 3, the base plate 10 being provided with suitable holes 13 for that purpose.

Along the longitudinal side edges of the base plate 10 I provide laterally spaced but preferably parallel vibratable sounding elements 14 and 15, preferably in the form of metal bars or plates, preferably differently dimensioned so as to emit distinguishing musical tones. These may be supported in any suitable way as by bushings 17 of rubber or other cushioning material which pass through suitably spaced holes in the sounding elements 14 and 15, being in turn secured to the upstanding arms of L-shaped brackets 16 that

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are secured to the base plate in any suitable manner as by spot welding.

In the space between the sounding elements 14, 15, near their lower ends, I provide a frame 18 having a front plate 18^a and side arms 18^b and 18^c which are flanged at their lower ends and secured to the base plate 10 as by spot welding. The front plate 18^a and the base plate 10 are provided with bearing holes 19 and 20 in which are rotatably supported the trunnioned or stepped ends of a shaft 21 which has rigidly secured to it an arm 22, the upper end of which carries a weighted head 23 provided with striker elements 25 and 26 made of fiber or hard wood and suitably seated and secured in appropriate recesses formed in the sides of the head 23. The arm 22 is oscillatable about the axis of shaft 21, which is preferably midway between the sounding elements 14, 15, thus to bring the striker heads 25 and 26 alternately into impacting engagement with the sounding elements 14 and 15 respectively.

The front plate 18^a and the base plate 10 are also provided with aligned bearing holes 28 and 29 forming bearings for the trunnioned or stepped ends of a sleeve 30 that has extending coaxially therethrough a hole 31 to receive a shaft 32 that extends through a hole 12^a in the door panel 12, its right-hand end being secured to a hub 33 that is rotatably carried in a suitable and preferably ornamental plate 34 secured to the outside face of the panel 12 as by screws 35, the hub 33 being provided with any suitable means such as a handle 36 for giving the hub and hence the shaft 32 a suitable rotary motion.

The shaft 32 extends more or less into the hole 31 in the sleeve 30, depending upon the thickness of the door panel 12, and any suitable means such as a set-screw 37 in the sleeve 30 may be provided to effect non-rotatable connection between the shaft 32 and the sleeve 30.

The sleeve 30 has fastened to it in any suitable way a driving plate 38 that has an upward extension provided with a driving connection with the arm 22. This driving connection preferably comprises a pin-and-slot or gear teeth arrangement, as is better shown in Fig. 1, in which the lower end of the arm 22, which can be a sheet-metal stamping, is provided with a downwardly projecting member 40, which may be rounded over as indicated and which is receivable in the slot or space between spaced tooth-like elements 41 formed in the driving plate 38, which also can be a sheet-metal stamping. The part 40 and the recess between the parts 41 are preferably dimensioned so that the reversible drive from one

to the other takes place without material play, so that the drive takes place substantially noiselessly.

The driving plate 38 has two spaced downwardly projecting parts 42 and 43 which extend downwardly below the frame 18 and coact with a rigid stud 44 rigidly secured to the base plate 10 (see Fig. 3) and which preferably projects through the space between the parts 42 and 43 beyond the front plate 18^a of the frame 18, and at its outer end it has secured thereto one end of a coiled spring 45, the other end of which is secured to a stud or arm 46 carried by the striker arm 22. About the stud 44 is preferably provided a sleeve or bushing 47 which is preferably made of a yieldable or resilient material, such as rubber, so as to be capable of coacting with the tensioned spring 45 and the striker head 23 preferably in a manner to effect impacting of either of the sounding elements 14—15 without damping the sound-emitting vibration thereof.

For this preferred coaction the parts are so dimensioned that in the "at rest" position shown in Fig. 1, with the spring 45 stressing the striker arm 22 counter-clockwise and the driving plate 38 clockwise, the part 43 of the driving plate 38 is in engagement with the resilient part 47 and the striker is just out of contact with the sounding element 14, being held just to the right of it as suggested in Fig. 1; this "at rest" position is maintained by a spring 49, one end of which is secured to the driving plate 38 and the other end is secured to an upstanding bracket 50 secured to the side arm 18^b of the frame 18. With the driving plate 38 actuated in counter-clockwise direction so as to bring the part 42 into engagement with the cushioning part 47, the striker arm 22 would occupy a position in which the striker just clears the sounding element 15 to the left thereof. In the former case the spring 45 extends to the left (in Fig. 1) of the line joining the axes of the driving plate 38 and the striker arm 22, and in the latter case the spring, or its line of pull, is to the right of that axes-joining line. Spring 49, in biasing the driving plate 38 to the above-described normal or "at rest" position of the parts, is thus effective also to position or hold the handle 36 in its starting position.

A suitable cover 51 (Figs. 2 and 3) closes over the entire mechanism, having side walls 52 which telescopically interfit with the flange 11 of the base plate 10 to which it is secured in any suitable manner, preferably detachably, and in the side walls adjacent the sounding elements 14 and 15 suitable apertures 53 may be provided for sound emission, the entire enclosure functioning as a resonator.

If the external actuator 36 is now turned to swing the driving plate 38 in counter-clockwise direction (Fig. 1) against the tension of spring 49, the driving connection 40—41 swings the striker arm 22 in clockwise direction, storing energy in or tensioning the spring 45 until the line of pull of the latter passes to the right of the line joining the axes of the parts 38 and 22, whence the energy of the spring 45 is extended to accelerate the swing of the striker arm 22, thus, with the aid of the weight of the striker head 23, giving the latter and the rigid striker arm 22 substantial velocity and momentum in its movement toward the sounding element 15. The rigid part 42 of the driving plate 38 is thereby made to approach the part 44—47 at much lower linear velocity, due to the leverage ratio, and when part 42 engages yieldable part 47, at which point the

striker element 26 would still be spaced to the left of the sounding element 15, the kinetic energy of the moving parts 22—23, acting through the multiplying action of the lever ratios, is sufficient to cause the rigid part 42 to compress the yielding part 47 without materially diminishing the velocity of the striker head 23, the relatively small amount of compression of the yielding part 47 being translated, due to the lever arm ratios and the driving connection, into a substantial possible continued movement of the striker head 23 beyond the above-mentioned point just to the left of the sounding element 15, whence the latter is given a sharp blow or impact from which the striker rebounds, thus to bring the striker quickly out of damping engagement with the sounding element, and this rebound may be aided by the reverse drive, through the driving plate 38 and driving connection to the striker arm 22, by the restoration of the yielding part 47 to its normal uncompressed condition, particularly where the part 47 is constructed to have substantial resiliency, as when it is made of a suitably compounded rubber.

During the just-described moving stroke to impact the sounding element 15, the biasing spring 49 is tensioned so that upon release of the external handle 36 the spring 49 swings the driving plate 38 in clockwise direction, thus reversing the above-described actions, this time to impact the sounding element 14 and to cause the part 43, instead of the part 42, to coact with the parts 44—47. The sounding element 14 is thus struck and the striker quickly moved out of damping action, and under the action of the springs and coacting parts, restored to the above-described "at rest" position.

Not only is fidelity of musical tone or tones achieved, but also many other advantages. Due to the multiplying action of the leverages, larger tolerances are possible in the manufacture and assembly of the parts with respect to the out-of-contact positions of the striker relative to the sounding elements, and principal consideration need be given primarily to the relationship between the parts 44—47 and the spaced parts 42—43 of the driving plate 38, and, if desired, the parts 42—43 may be constructed to be bendable, for speed and ease of adjustment of the parts, it being noted that, due to the driving connection and the lever arm ratios of the parts, only a small adjustment of either part 42 or part 43 so affects its coaction with the parts 44—47 as to have a much greater effect in the normal or non-striking positions of the striker at the end of the rigid striker arm 22. Furthermore, the parts will be seen to be of simple and inexpensive construction, capable of ready assembly, and also that the structure is easy to install and is reliable in action.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a signalling device comprising two spaced sounding elements, striker means and actuating means therefor, the combination of a substantially rigid lever rotatably mounted between said elements in a position to swing in an arcuate path between them, said lever having a relatively long arm adapted to serve as a striker and an oppositely extending short arm, a rotatably

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mounted operating shaft, a rocker pivotally mounted on said shaft and having a first arm adapted to engage the said short arm of said lever and swing it oppositely to the direction of rotation of said rocker, a fixed stop, a second arm on said rocker having a bifurcated end the bifurcations of which straddle said fixed stop and in cooperation with said fixed stop serve to limit the rotation of said rocker in either direction, said bifurcations being spaced apart a distance such that one or the other contacts said fixed stop before the striker strikes either of said sounding elements, said stop means including resilient means adapted to yield sufficiently to permit the striker arm of said lever to move the additional angular distance necessary to strike the striker element toward which it is moving and a spring interconnected between the long arm of said lever and the point below the pivot for said lever and movable across the said pivot whereby snap action is imparted to the lever.

2. In a signalling device comprising two spaced sounding elements, striker means, and actuating means therefor, the combination of a substantially rigid lever rotatably mounted between said elements in a position to swing in an arcuate path between them, said lever having a relatively long arm adapted to serve as a striker and an oppositely extending short arm, and actuating means comprising a rotatably mounted operating shaft, a rocker pivotally mounted on said shaft and having a first arm adapted to engage the said short arm of said lever and swing it oppositely to the direction of rotation of said rocker, a fixed stop, a second arm on said rocker having a bifurcated end the bifurcations of which straddle said fixed stop and in cooperation with said fixed stop serve to limit the rotation of said rocker in either direction, said bifurcations being spaced apart a distance such that one or the other of said ends contacts said fixed stop before the striker strikes either of said sounding elements, said stop means including resilient means adapted to yield sufficiently to permit the striker arm of said lever to move the additional angular distance necessary to strike

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the sounding element toward which it is moving, a spring interconnecting the striker arm and said fixed stop and movable with the striker across the pivot of the striker, and means cooperating with said rocker and adapted to be placed under stress by movement of said rocker in either direction thereby building up potential energy whereby it cooperates with said yielding stop element to reverse the direction of rotation of said striker arm immediately after contact of the striking arm with either of said sounding elements.

3. In a signalling device having spaced sounding elements, striker means, and actuating means therefor, the combination of means mounting said striker means between said sounding elements for movement in directions first to strike one element and then the other, said mounting means comprising, a rigid arm having striker means secured at one end thereof, means pivotally supporting said arm intermediate its ends, a rocker pivotally mounted beyond the said pivot of said arm from said striker means, said rocker having mechanical connection to the end of said arm opposite to said striker means to swing said arm oppositely to the direction of rotation of said rocker, spring means interconnected between said arm and a point beyond the pivot of said arm, said spring means being movable with said arm across the pivot of said arm whereby snap action is given to the strokes of said arm, and means limiting the extent of movement of said rocker in either direction to cause said arm to be out of contact with either sounding element while at rest.

GEORGE R. FISH.

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